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BERTRAM P. BROWN, M. D., Director



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GUY P. JONES
Editor

LABORATORY DETERMINATION OF NUTRITIONAL STATUS

(Continued from last issue)

VITAMIN C

This water soluble vitamin is essential for tissue respiration, normal endothelium and glandular function. It seems to improve the appetite, stimulates growth and protects the vascular system.

Although no one knows that saturation with vitamin C is the optimum state for an individual, the blood plasma saturation with ascorbic acid is from 1.0-1.4 mgm. per cent. Urinary excretion of ascorbic acid has been shown to be slight and often negligible so long as the plasma concentration remains low.

A patient who has not previously been supplied with vitamin C by his diet when given a test dose of 200 mgms. will excrete less than 10 per cent of the intake, using or storing the administered product avidly and completely.

A child who has been adequately supplied with vitamin C in his diet will dispose of the excess load in the urine if given a test dose almost at once. These principles have been used by the laboratory nutritionists in devising tests for vitamin C nutrition. These tests either determine the amount of saturation of the blood or the amount spilled in the urine.

The best of the former type has been devised by Kadji.* He states that the customary vitamin C determination in blood plasma is not an adequate criterion of nutritional state. However, values below .20 per cent usually indicate scurvy and below .60 mgm. per cent indicate serious depletion of deposits.

Kadji has developed what he calls a vitamin C index which equals the initial value times the increase

4 hours after the injection of 200 mgms. of ascorbic acid times 100. In active scurvy the index is invariably below 0.8. Indices from 0.8-6.0 indicate very definite decrease in reserves, and in normal subjects the index is usually well above 10.0.

Greenberg and Rinehart in unpublished studies have shown that a group of individuals who have true ascorbic values of 0-0.1 mgm. per cent in their blood plasma need 2.5-4 gms. of ascorbic acid in order to saturate them, while those with initial values of 0.1-0.2 mgm. per cent need only 1-2 gms. This also gives us a simple method of determination of tissue deficit for vitamin C. Frequently, but not invariably, a rise in reticulocyte count and an improvement in capillary fragility follows the improvement in vitamin C nutrition.

There is a definite feeling among some nutritional chemists that the state of vitamin C nutrition is an excellent if not the best index of good nutrition. The tests are simple and practical for our purposes.

VITAMIN D

Calcium and phosphorus values of the blood and x-rays of the bones for a degree of calcification may be used but these are not disturbed until rickets become marked and are of little value in determining latent vitamin D deficiency.

MINERALS

Of all the possible mineral deficiencies, Fe (iron) is the only one which is practical to determine at this time and this is done indirectly by the determination by hemoglobin and red blood cell counts for size and hemoglobin load of the blood cells.

Blood iodine methods are rapidly developing.

* Kadji: A Test for the Determination of Vitamin C Storage, J. Ped., 15:197, 1939.

LACTO-BACILLUS ACIDOPHILUS COUNT

There is a definite association of lacto-bacillus acidophilus count in the saliva to arrested or rampant dental caries. For our purposes, that of making a study of children before and after, let us say, a school lunch program has been instituted, I believe we should include the lacto-bacillus acidophilus count in the saliva as part of our laboratory evaluation. Whatever the effect may be there is increasing evidence that if dental caries can not be arrested, there is something wrong with the diet.

CONCLUSION

I would be neglecting my responsibility as a clinician, speaking of laboratory determination of nutritional states, if in this final paragraph I would not issue a word of warning. We should not be too quick to apply conclusions gained in animal experimentation to the human race. If we find racial and age groups of the human being variable, how much greater is the variability between species. The rat, capable of manufacturing his own vitamin C, is quite unlike the guinea pig, and the dog is quite different from the rabbit in point of digestion.

The appraisal of "optimum" nutrition of an individual, or a group, implies information which is rarely attainable. It can easily become involved in the matter of definition, terms, and reservations. This is because criteria for the recognition of deficiencies in any but the most advanced states are not found in the usual physical examination.

Dietary inquiries are of value, but are by no means infallible. We may expect malnutrition in any person or group inadequately fed but the hypothetical optimum will vary with racial, age, and climatic factors. The growing child will need a larger proportion of protein than the adult who is stabilized in growth. Occupational conditions will also modify both quality and quantity of food requirements. Finally, the digestive capacity and food utilization may determine to a large extent the adequacy of nutrition regardless of the proper quality and proportions of food intake.

Anthropometric measurements, likewise, are inadequate in gauging nutrition status. The familial and racial and constitutional tendencies are widely appreciated in this role. New techniques for making objective appraisals are being developed. These may be of inestimable value for "screening," particularly those 30 per cent who are in poor or borderline panels of nutritional states.

So we come back to the laboratory. When we can at long last apply chemical and physical techniques we can enrich our existing methods to marked

degrees. While we have not in any way approached the millenium with these techniques, we are well on the way. Simple, practical methods are not at our disposal. For the present, a combination of all these methods of appraisal is safest.

Nutritionists, physicians, dentists and public health educators have no paucity of written material outlining our objectives and means of attaining these objectives. We must now work harder to convince the public, our colleagues and fellow-workers the importance of what we have learned and what we teach.

I am indebted to Dr. Ellarene L. McCoy, District Pediatrician of the California State Department of Health, for much of the material relating to biochemical tests for specific nutritional deficiency.

FUMES FROM COATED WELDING RODS

In a shipyard, 25 welders became nauseated recently while using a new type of coated welding rod. In an investigation made at the request of the plant safety director, it was learned that the affected employees were working on the outside of ships, with excellent natural ventilation. The men stated that they had never experienced similar symptoms while using other makes of welding rods. Laboratory analyses of the rods in question showed the presence of manganese, but no other toxic ingredients which might be volatilized during welding operations. Since manganese fumes have not been found to cause nausea without other symptoms, particularly nervous disturbances, it is not believed that the temporary illness of these welders, which lasted only a few hours, is attributable to their employment. However, atmospheric tests will be made to determine the concentration of manganese fumes to which the welders are exposed.

COLD STORAGE

Inspection of cold storage plants for products held over the statutory period of one year revealed, in one establishment, home-canned turkey meat, and 1,170 pounds of assorted meats all in a putrid state and voluntarily condemned for destruction by the owners.

DAMAGED FOODS

Fire damaged stocks of three grocery stores were inspected, and as a result more than a ton of almonds affected by smoke or fire was converted to almond oil. Crackers, cookies, breakfast food, sugar and candy were destroyed. Nearly 1,000 cans of condensed bean soup was destroyed by puncturing each can and burning at a municipal dump.

MOSQUITO CONTROL CONFERENCE ANNOUNCED

The California Mosquito Control Association will hold its twelfth annual conference in Agriculture Hall, University of California, Berkeley, December 15 and 16, 1941. An unusually interesting and instructive program has been prepared and those who may be in attendance will derive maximum benefits through the contributions that recognized authorities will make. A symposium on equine encephalomyelitis and the subject of mosquito control and National defense provide key subjects for consideration.

The annual banquet will be held on the evening of December 15th at which time Dr. Alfred C. Reid of the Division of Preventive Medicine, University of California Medical School, will discuss problems involved in the control of mosquito-borne diseases under tropical conditions.

Following is the complete program:

December 15-16, 1941

First Day—9.00 a.m.

I. OPENING ADDRESS—

President Earnest Campbell, Superintendent Contra Costa County Mosquito Abatement District.

A. Brief Business Meeting.

II. SYMPOSIUM ON EQUINE ENCEPHALOMYELITIS.

A. Introduction by W. B. Herms, Professor of Parasitology, and Chairman of Division of Entomology, University of California.

B. The Relationship of Equine Encephalomyelitis and St. Louis Encephalitis to Man and Animals in California—Miss Beatrice F. Howitt, Hooper Foundation.

C. Newer Developments in Knowledge of Insect Hosts and Vectors—William C. Reeves, University of California.

D. Host Animals of Virus Encephalitis—Dr. W. McD. Hammon, Hooper Foundation.

Discussion by:

Dr. W. T. Harrison, Liaison Officer, U. S. Public Health Service, 9th Corps Headquarters.

Dr. Ellis D. Sox, Coordinating Officer, California State Department of Public Health.

LUNCHEON

III. MOSQUITO CONTROL AND NATIONAL DEFENSE.

A. Introduction by Dr. Bertram P. Brown, Director, State Department of Public Health.

B. Military Mosquito Control in World War I—Dr. S. B. Freeborn, Professor of Entomology and Assistant Dean, College of Agriculture, University of California, Berkeley.

C. Federal Aid in Mosquito Control Work—Dr. R. H. Creel, District Director, U. S. Public Health Service.

D. Mosquito Breeding and Control in Vicinity of Military Zones—R. F. Peters, State Mosquito Control Officer.

Discussion.

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ANNUAL BANQUET

Durant Hotel, Berkeley, California—7.00 p.m.
\$1.25 per plate

“Problems Involved in Control of Mosquito-Borne Diseases Under Tropical Conditions”

Dr. Alfred C. Reid, Speaker

Division of Preventive Medicine, University of California Medical School.

Second Day—9.00 a.m.

I. Review of Literature—Professor W. B. Herms.

II. 10.00 a.m. to 12 noon—Laboratory demonstration on identification of California mosquitos, under the direction of William C. Reeves.

LUNCHEON

III. Recent Changes in Legislation Affecting Mosquito Control Operations—Harold F. Gray.

IV. Effect of Priorities and National Defense on Mosquito Control Operations—Fred Hayes.

V. Operators Symposium—

Conducted by H. F. Gray—

A. Power Spraying—Roland Bendel.

B. Larvicides—Chester Robinson.

C. Mosquito Fish.

D. Breeding in Sewer Farms.

E. Controlled Reflooding.

F. Rice Field Control.

G. Etc.

VI. Concluding Business Meeting.

ON-SALE INSPECTIONS

There is a marked increase in the number of violations of liquor standards in the Pure Foods Act. This is probably due to the curtailed imports of cognacs and Scotch whiskies. In one area of the State the average of violations of the on-sale laws reached 6 per cent in October. Of 300 inspections, 16 were found, with a total of 59 bottles of liquor which were either adulterated or refilled. In some districts it was necessary to carry on inspections until as late as 3.00 a.m. A close program of cooperation with the State Board of Equalization was maintained.

MISCELLANEOUS FOOD VIOLATIONS

The increased cost of dried mushrooms has led to the practice of adding small chili pods to increase the bulk.

Analysis of a sample of vinegar revealed the presence of glacial acetic acid, citric acid and excessive amounts of water with a coal tar dye as color agent.

The Bureau of Food and Drug Inspection is endeavoring to keep a close track of bread that is fortified with yeast, iron, vitamins and other products that make the sale of bread a veritable gold mine for flagrant advertisers. Every effort is being made to limit advertising to truthful statements. Vitamin claims for bread are generally based on the average vitamin content per loaf before baking. What the actual vitamin content is after baking, is problematical.

The slogans "Good for Teeth and Gums," and "Aids Digestion" employed by a popcorn manufacturer on his store windows was found objectionable and removal was agreed upon.

MEAT PRODUCTS

Prosecution of individuals who adulterate hamburger with sodium sulphite were continued by the Bureau of Food and Drug Inspection during October. In Stockton one defendant was fined \$100, in Lincoln a defendant was fined \$30, in Vallejo the offender was given a \$50 fine and in Tulare the justice of the peace fined the defendant \$100 and convicted him to six months in the county jail, the jail sentence having been suspended with the provision that future violations would result in serving the suspended jail sentence. This defendant had disregarded a warning when prosecuted for the same offense in December of 1940. The bureau's drive to eliminate this practice was continued in other counties of the State. In two counties samples of ground meat were taken in 21 markets.

MORBIDITY**Complete Reports for Following Diseases for Week Ending November 15, 1941****Chickenpox**

525 cases from the following counties: Alameda 122, Contra Costa 31, Fresno 28, Kern 8, Los Angeles 93, Madera 12, Marin 2, Mendocino 1, Merced 3, Orange 8, Plumas 17, Riverside 9, Sacramento 14, San Bernardino 1, San Diego 33, San Francisco 13, San Joaquin 27, San Luis Obispo 10, San Mateo 10, Santa Barbara 25, Santa Clara 12, Santa Cruz 5, Sonoma 1, Stanislaus 29, Sutter 1, Tulare 3, Ventura 4, Yolo 2, Yuba 1.

German Measles

104 cases from the following counties: Alameda 4, Butte 1, Fresno 3, Kern 2, Los Angeles 20, Madera 2, Modoc 5, Monterey 1, Orange 2, Riverside 1, Sacramento 1, San Diego 10, San Francisco 16, San Luis Obispo 4, San Mateo 2, Santa Barbara 17, Santa Clara 8, Stanislaus 1, Tulare 1, Ventura 3.

Measles

353 cases from the following counties: Alameda 12, Butte 1, Fresno 5, Humboldt 1, Kern 19, Los Angeles 43, Madera 1, Mendocino 89, Modoc 5, Monterey 11, Napa 1, Riverside 2, San Benito 1, San Diego 7, San Francisco 3, San Joaquin 97, San Luis Obispo 1, San Mateo 1, Santa Clara 1, Sonoma 6, Stanislaus 1, Sutter 1, Tulare 24, Ventura 16, Yolo 4.

Mumps

661 cases from the following counties: Alameda 45, Colusa 6, Contra Costa 31, Fresno 9, Humboldt 1, Kern 16, Lassen 18, Los Angeles 107, Madera 11, Monterey 31, Orange 24, Placer 1, Riverside 11, Sacramento 50, San Bernardino 9, San Diego 52, San Francisco 30, San Joaquin 83, San Luis Obispo 11, San Mateo 13, Santa Barbara 29, Santa Clara 37, Santa Cruz 5, Sonoma 10, Stanislaus 2, Tulare 5, Tuolumne 1, Ventura 7, Yolo 6.

Scarlet Fever

140 cases from the following counties: Alameda 1, Fresno 1, Imperial 2, Kern 8, Los Angeles 48, Madera 1, Marin 2, Merced 4, Modoc 9, Monterey 1, Napa 8, Orange 5, Placer 1, Plumas 6, Riverside 6, Sacramento 1, San Bernardino 1, San Diego 15, San Francisco 4, San Joaquin 1, San Luis Obispo 1, San Mateo 1, Santa Barbara 1, Santa Clara 4, Solano 1, Sonoma 3, Sutter 1, Tulare 1, Tuolumne 1, Yolo 1.

Whooping Cough

166 cases from the following counties: Alameda 13, Fresno 5, Kern 8, Los Angeles 77, Madera 2, Monterey 1, Orange 3, San Diego 22, San Francisco 4, San Joaquin 6, San Luis Obispo 2, Santa Barbara 12, Santa Clara 2, Santa Cruz 1, Solano 5, Sonoma 2, Ventura 1.

Diphtheria

14 cases from the following counties: Alameda 1, Los Angeles 5, Modoc 1, Orange 1, Riverside 1, Sacramento 2, San Luis Obispo 2, Santa Clara 1.

Dysentery (Bacillary)

3 cases from the following counties: Los Angeles 2, Sacramento 1.

Food Poisoning

19 cases from the following counties: Alameda 2, Contra Costa 1, Fresno 11, Kern 4, San Francisco 1.

Influenza

82 cases reported in the State.

Jaundice (Epidemic)

14 cases from the following counties: Los Angeles 4, Modoc 10.

Meningitis (Epidemic)

One case from Alameda County.

Paratyphoid Fever

One case from Los Angeles County.

Poliomyelitis

2 cases: Los Angeles County 1 (Los Angeles); Santa Clara County 1 (San Jose).

Rabies (Animal)

3 cases from the following counties: Los Angeles 2, San Mateo 1.

Trichinosis

One case from Alameda County.

Typhoid Fever

3 cases from the following counties: Fresno 1, Los Angeles 2.

Typhus Fever

One case from San Diego County.

Undulant Fever

8 cases from the following counties: Kern 1, Los Angeles 7.

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San Francisco, Calif.

